PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Jaakko HANHINEN et al. Attn: PCT Branch

Application No. New U.S. National Stage of PCT/FI03/0695

Filed: February 18, 2005 Docket No.: 122834

For: CONTROLLING FEEDING OF SOLID MATTER

SUBMISSION OF THE ANNEXES TO THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Attached hereto is a translation of the annexes to the International Preliminary Examination Report (Form PCT/IPEA/409). The attached material replaces the claims.

Respectfully submitted,

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Date: February 18, 2005

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CLAIMS

1. A method for controlling feeding of solid matter in a process which comprises at least one unloading point (UP) for solid matter, at least one belt conveyor (2, 2', 3, 5) and at least one feeding point (SP) for solid matter, solid matter being unloaded in the unloading point (UP) from solid matter storage to a belt conveyor (2, 2'), which is arranged to convey said solid matter either directly or via at least one other belt conveyor (3, 5) to the feeding point (SP), **characterized** by

determining a set value for the thickness of a material bed formed of the solid matter to be unloaded to the belt conveyor (2, 2');

controlling the unloading of the solid matter to the belt conveyor (2, 2') in the unloading point (UP) in such a way that the thickness of the material bed follows said set value; and

controlling in the feeding point (SP) the amount of solid matter to be fed by controlling the speed (S) of the belt conveyor (2, 2', 3, 5).

2. A method according to claim 1, **characterized** by feeding solid matter in the feeding point (SP) to solid matter intermediate storage, storage tank or a solid matter treatment process, from which intermediate storage or storage tank said solid matter is unloaded for further treatment, or said solid matter discharges passively for further treatment, or in which treatment process said solid matter is treated further.

3. A method according to claim 1 or 2, **characterized** by the thickness of the material bed formed of solid matter being the mass of the solid matter per length unit of the belt conveyor (2, 2', 3, 5), the volume of the solid matter per length unit of the belt conveyor (2, 2', 3, 5) or the cross-sectional area of the material bed formed of solid matter.

4. A method according to any one of the preceding claims, **characterized** by

determining an amount target (CU_{SP}) for the solid matter to be fed to the intermediate storage, storage tank or treatment process on the basis of the amount of solid matter discharged from the intermediate storage or the amount of solid matter treated in the treatment process;

controlling the amount of solid matter to be fed in the feeding point (SP) on the basis of the amount target for the solid matter by adjusting the

speed (S) of the belt conveyor (2, 2', 3, 5) on the basis of the amount target (CU_{SP}) for the solid matter; and

controlling the unloading speed (SU) of the solid matter unloaded to the belt conveyor (2, 2') in the unloading point (UP) on the basis of the speed (S) of the belt conveyor (2, 2') in such a way that the thickness of the material bed formed of the solid matter unloaded to the belt conveyor (2, 2') follows the set value set for the material bed thickness.

5. A method according to any one of the preceding claims, **characterized** by the set value of the thickness of the material bed of the solid matter unloaded to the belt conveyor (2, 2') being a permanently fixed constant value.

6. A method according to any one of the preceding claims, **characterized** by defining a material bed profile (PROF) expressing variation in the thickness of the material bed of the solid matter on the belt conveyor (2, 2', 3, 5) in the longitudinal direction of the belt conveyor (2, 2', 3, 5) on the basis of the speed (S) of the belt conveyor (2, 2', 3, 5) and the speed (SU) of the unloader (1, 1'); and

determining the material flow travelling on the belt conveyor (2, 2', 3, 5) on the basis of said profile (PROF).

7. A method according to claim 6, **characterized** by defining a variable (M_{CU}, M_C) expressing the weight of the solid matter on the belt conveyor (2, 2', 3, 5); and updating the profile (PROF) of the material bed formed of the solid matter at a particular point of the belt conveyor (2, 2', 3, 5) on the basis of the variable (M_{CU}, M_C) expressing the weight of the solid matter on the belt conveyor.

8. A method according to claim 6 or 7, **characterized** by combining solid matter kind and/or grade information with the material bed profile (PROF) expressing variation in the thickness of the material bed of the solid matter on the belt conveyor (2, 2', 3, 5) in the longitudinal direction of the belt conveyor (2, 2', 3, 5).

9. A method according to any one of the preceding claims, **characterized** by the solid matter being of chips and the intermediate storage being a chip silo (6).

10. A method according to any one of claims 1 to 8, **characterized** by the solid matter being solid fuel and the solid matter

treating process being a power boiler, where solid matter is combusted for producing energy.

11. A method according to claim 1 to 8, **characterized** by the solid matter being of rock, concrete and/or asphalt and the solid matter treating process being a crushing, screening and/or mixing process.

12. An apparatus for controlling feeding of solid matter in a process which comprises at least one unloading point (UP) for solid matter, at least one belt conveyor (2, 2', 3, 5) and at least one feeding point (SP) for solid matter, solid matter being arranged to be unloaded in the unloading point (UP) from solid matter storage to a belt conveyor (2, 2'), which is arranged to convey said solid matter either directly or via at least one other belt conveyor (3, 5) to the feeding point (SP), **characterized** in that the apparatus is arranged

to determine a set value for the thickness of a material bed formed of the solid matter to be unloaded to the belt conveyor (2, 2');

to control the unloading of the solid matter to the belt conveyor (2, 2') in the unloading point (UP) in such a way that the thickness of the material bed follows said set value; and

to control the amount of solid matter to be fed in the feeding point (SP) by controlling the speed (S) of the belt conveyor (2, 2', 3, 5).

13. An apparatus according to claim 12, **characterized** in that in the feeding point (SP) the solid matter is arranged to be fed to solid matter intermediate storage, storage tank or a solid matter treatment process, from which intermediate storage said solid matter is arranged to be unloaded or said solid matter is arranged to discharge passively for further treatment, or in which treatment process said solid matter is arranged to be treated further.

14. An apparatus according to claim 12 or 13, **characterized** in that the thickness of the material bed formed of solid matter is the mass of the solid matter per length unit of the conveyor (2, 2', 3, 5), the volume of the solid matter per length unit of the belt conveyor (2, 2', 3, 5) or the area of the cross-section of the material bed formed of solid matter.

15. An apparatus according to claim 12 to 14, **characterized** in that

the apparatus is arranged to determine an amount target (CU_{SP}) for the solid matter to be fed to the intermediate storage or treating process on the basis of the amount of solid matter exiting from the intermediate storage or storage tank or the amount of solid matter treated in the treatment process;

the apparatus is arranged to control the amount of solid matter to be fed in the feeding point (SP) by adjusting the speed (S) of the belt conveyor (2, 2', 3, 5) on the basis of the amount target (CU_{SP}) for the solid matter; and that

the apparatus is arranged to control the unloading speed (SU) of the solid matter unloaded to the belt conveyor (2, 2') in the unloading point (UP) on the basis of the speed (S) of the belt conveyor (2, 2') in such a way that the thickness of the material bed formed of the solid matter unloaded to the belt conveyor (2, 2') follows the set value set for the thickness of the material bed.

16. An apparatus according to any one of claims 12 to 15, **characterized** in that the set value of the thickness of the material bed of the solid matter unloaded to the belt conveyor (2, 2') is a permanently fixed constant value.

17. An apparatus according to any one of claims 12 to 16, **characterized** in that the apparatus is further arranged to define a material bed profile (PROF) expressing variation in the thickness of the material bed of the solid matter on the belt conveyor (2, 2', 3, 5) in the longitudinal direction of the belt conveyor (2, 2', 3, 5) on the basis of the speed (S) of the belt conveyor (2, 2', 3, 5) and the speed (SU) of the unloader (1, 1'); and that

the apparatus is arranged to determine the material flow travelling on the belt conveyor (2, 2', 3, 5) on the basis of said profile (PROF).

18. An apparatus according to claim 17, **characterized** in that the apparatus comprises means for determining a variable (M_C, M_{CU}) expressing the weight of the solid matter on the belt conveyor (2, 2', 3, 5); and that the apparatus is arranged to update the profile (PROF) of the material bed of the solid matter being at a given point of the belt conveyor (2, 2', 3, 5) on the basis of the variable (M_C, M_{CU}) expressing the weight of the solid matter on the belt conveyor (2, 2', 3, 5).

19. An apparatus according to any one of claims 17 or 18, **characterized** in that the apparatus is arranged to combine solid matter kind and/or grade information with the material bed profile (PROF) expressing variation in the thickness of the material bed of the solid matter on the belt conveyor (2, 2', 3, 5).

20. An apparatus according to any one of claims 12 to 19, **characterized** in that the solid matter is formed of chips and that the intermediate storage is a chip silo (6).

21. An apparatus according to any one of claims 12 to 19, **characterized** in that the solid matter is solid fuel and that the treatment process of the solid matter is a power boiler, where the solid matter is arranged to be combusted for producing energy.

22. An apparatus according to any one of claims 12 to 19, **characterized** in that the solid matter is rock, concrete and/or asphalt and that the solid matter treatment process is a crushing, screening and/or mixing process.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION See Form PCT/IPEA/416	
2021358pc/nu		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/FI2003/000695	24-09-2003	25-09-2002
International Patent Classification (IPC) or national classification and IPC		
G05D 7/06, G05D 9/00, G01G 11/12, G01G 13/28		
Applicant		
METSO AUTOMATION OY et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 5 sheets, as follows:
      - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
17-03-2004	07-12-2004
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88	Authorized officer Ender Dag/itw Telephone No. +46 8 782 25 00

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

☐ international search (under Rules 12.3 and 23.1(b))
☐ publication of the international application (under Rule 12.4)
☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

☐ the international application as originally filed/furnished

☒ the description:

pages 1-13 as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☒ the claims:

pages _____ as originally filed/furnished
pages* _____ as amended (together with any statement) under Article 19
pages* 14-18 received by this Authority on 29-07-2004
pages* _____ received by this Authority on _____

☒ the drawings:

pages 1-2 as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing *(specify)*: _____
☐ any table(s) related to the sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing *(specify)*: _____
☐ any table(s) related to the sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/FI2003/000695

Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-22	YES
	Claims		NO
Inventive step (IS)	Claims	1-22	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-22	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Documents cited in the International Search Report:

D1: US 4232781 A
D2: US 3165195 A
D3: GB 854215 A
D4: US 4595125 A
D5: GB 2180497 A
D6: GB 2136754 A

The applicant describes the problem of the control of feeding of a solid matter by adjusting the speed of the belt conveyer in a process. Prior art discloses methods for the solid matter to either actively be guided with separate feeding devices away from the conveyor or passively discharges from the conveyor. The object of the present application is a more accurate way to control the speed of the belt conveyor on the basis of the thickness of the material bed to follow a said set value, according to the applicant.

Document D1 discloses a method of and apparatus for operating a dosing arrangement for material having different specific weights, flow properties, and other properties. The dosing arrangement is provided with a controllable or variable drive which is combined with a belt conveyor. The drive for the dosing device and/or belt conveyor is adjusted prior to the start of a dosing process for regulating a desired thickness of the load of the conveyor belt in relation to the drive speed of the conveyor belt and also permits controlling the drive for the dosing device (see column 3, lines 1-48, column 4, lines 29-62, column 6, lines 24-28, column 7, lines 9-44;

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Box V

figures 1-2).

Document D2 discloses an apparatus with means operative for regulating the relative speeds of a delivering feeding conveyor of wood chips onto a receiving run-out conveyor in order to obtain a layer of desired height (see column 2, line 36 - column 3, line 66; figure 2).

Document D3 discloses an electric control system for controlling a physical characteristic of a continuously moving material in accordance with an adjustable reference signal (see whole document),

Document D4 discloses a feeder capable of discharging from the back storage bin a precise volume per unit time of material to deposit onto the conveyor of a continuous weigh scale. The weigh scale like the feeder is driven by variable speed drive motor under the control of a control circuit responsive to changes in bulk density of the particulate material (see whole document).

Document D5 discloses an apparatus for automatically weighing extruded thermoplastic sections, comparing weights with predetermined standards rejecting or accepting product, and correcting extrusion parameters (see whole document).

Document D6 discloses a method of and device for metering bulk material in which the bulk material is discharged from a bin and then volumetrically metered on a circulating belt and brought onto a forming belt (see whole document).

The invention according to claims 1-22 differs from what is known in D1-D6 in that the material flow travelling on a belt conveyor is on the basis of a material bed profile expressing variation in the thickness of the material bed in the longitudinal direction of the belt conveyor. This improves the accuracy of the control of feeding solid matter by adjusting the speed of the belt conveyor on the basis of the material bed profile. It is possible to know exactly the material flow of solid matter in the feeding point and thereby to control feeding of solid matter at feeding point by adjusting the speed of the conveyor. This eliminates the possibilities of

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Box V

long delays related to the controls of long conveyor systems.

Hence it is not obvious for a person skilled in the art to modify D1-D6 to solve the same problem as referred in the claimed invention.

The invention according to claims 1-22 is novel, industrial applicable and is considered to involve an inventive step.

CLAIMS

1. A method for controlling feeding of solid matter in a process which comprises at least one unloading point (UP) for solid matter, at least one belt conveyor (2, 2', 3, 5) and at least one feeding point (SP) for solid matter, solid matter being unloaded in the unloading point (UP) from solid matter storage to a belt conveyor (2, 2'), which is arranged to convey said solid matter either directly or via at least one other belt conveyor (3, 5) to the feeding point (SP), **characterized** by

determining a set value for the thickness of a material bed formed of the solid matter to be unloaded to the belt conveyor (2, 2');

controlling the unloading of the solid matter to the belt conveyor (2, 2') in the unloading point (UP) in such a way that the thickness of the material bed follows said set value;

determining a material bed profile (PROF) expressing variation in the thickness of the material bed in the longitudinal direction of the belt conveyor (2, 2', 3, 5);

determining the material flow travelling on the belt conveyor (2, 2', 3, 5) on the basis of said profile (PROF); and

controlling in the feeding point (SP) the amount of solid matter to be fed by controlling the speed (S) of the belt conveyor (2, 2', 3, 5).

2. A method according to claim 1, **characterized** by feeding solid matter in the feeding point (SP) to solid matter intermediate storage, storage tank or a solid matter treatment process, from which intermediate storage or storage tank said solid matter is unloaded for further treatment, or said solid matter discharges passively for further treatment, or in which treatment process said solid matter is treated further.

3. A method according to claim 1 or 2, **characterized** by the thickness of the material bed formed of solid matter being the mass of the solid matter per length unit of the belt conveyor (2, 2', 3, 5), the volume of the solid matter per length unit of the belt conveyor (2, 2', 3, 5) or the cross-sectional area of the material bed formed of solid matter.

4. A method according to any one of the preceding claims, **characterized** by

determining an amount target (CU_{SP}) for the solid matter to be fed to the intermediate storage, storage tank or treatment process on the basis of the

amount of solid matter discharged from the intermediate storage or the amount of solid matter treated in the treatment process;

controlling the amount of solid matter to be fed in the feeding point (SP) on the basis of the amount target for the solid matter by adjusting the speed (S) of the belt conveyor (2, 2', 3, 5) on the basis of the amount target (CU_{SP}) for the solid matter; and

controlling the unloading speed (SU) of the solid matter unloaded to the belt conveyor (2, 2') in the unloading point (UP) on the basis of the speed (S) of the belt conveyor (2, 2') in such a way that the thickness of the material bed formed of the solid matter unloaded to the belt conveyor (2, 2') follows the set value set for the material bed thickness.

5. A method according to any one of the preceding claims, **characterized** by the set value of the thickness of the material bed of the solid matter unloaded to the belt conveyor (2, 2') being a permanently fixed constant value.

6. A method according to any one of the preceding claims, **characterized** by defining a material bed profile (PROF) expressing variation in the thickness of the material bed of the solid matter on the belt conveyor (2, 2', 3, 5) in the longitudinal direction of the belt conveyor (2, 2', 3, 5) on the basis of the speed (S) of the belt conveyor (2, 2', 3, 5) and the speed (SU) of the unloader (1, 1').

7. A method according to claim 6, **characterized** by defining a variable (M_{CU}, M_C) expressing the weight of the solid matter on the belt conveyor (2, 2', 3, 5); and updating the profile (PROF) of the material bed formed of the solid matter at a particular point of the belt conveyor (2, 2', 3, 5) on the basis of the variable (M_{CU}, M_C) expressing the weight of the solid matter on the belt conveyor.

8. A method according to claim 6 or 7, **characterized** by combining solid matter kind and/or grade information with the material bed profile (PROF) expressing variation in the thickness of the material bed of the solid matter on the belt conveyor (2, 2', 3, 5) in the longitudinal direction of the belt conveyor (2, 2', 3, 5).

9. A method according to any one of the preceding claims, **characterized** by the solid matter being of chips and the intermediate storage being a chip silo (6).

10. A method according to any one of claims 1 to 8, **characterized** by the solid matter being solid fuel and the solid matter treating process being a power boiler, where solid matter is combusted for producing energy.

11. A method according to claim 1 to 8, **characterized** by the solid matter being of rock, concrete and/or asphalt and the solid matter treating process being a crushing, screening and/or mixing process.

12. An apparatus for controlling feeding of solid matter in a process which comprises at least one unloading point (UP) for solid matter, at least one belt conveyor (2, 2', 3, 5) and at least one feeding point (SP) for solid matter, solid matter being arranged to be unloaded in the unloading point (UP) from solid matter storage to a belt conveyor (2, 2'), which is arranged to convey said solid matter either directly or via at least one other belt conveyor (3, 5) to the feeding point (SP), **characterized** in that the apparatus is arranged

to determine a set value for the thickness of a material bed formed of the solid matter to be unloaded to the belt conveyor (2, 2');

to control the unloading of the solid matter to the belt conveyor (2, 2') in the unloading point (UP) in such a way that the thickness of the material bed follows said set value;

to determine a material bed profile (PROF) expressing variation in the thickness of the material bed in the longitudinal direction of the belt conveyor (2, 2', 3, 5);

to determine the material flow travelling on the belt conveyor (2, 2', 3, 5) on the basis of said profile (PROF); and

to control the amount of solid matter to be fed in the feeding point (SP) by controlling the speed (S) of the belt conveyor (2, 2', 3, 5).

13. An apparatus according to claim 12, **characterized** in that in the feeding point (SP) the solid matter is arranged to be fed to solid matter intermediate storage, storage tank or a solid matter treatment process, from which intermediate storage said solid matter is arranged to be unloaded or said solid matter is arranged to discharge passively for further treatment, or in which treatment process said solid matter is arranged to be treated further.

14. An apparatus according to claim 12 or 13, **characterized** in that the thickness of the material bed formed of solid matter is the mass of the solid matter per length unit of the conveyor (2, 2', 3, 5), the volume of the

solid matter per length unit of the belt conveyor (2, 2', 3, 5) or the area of the cross-section of the material bed formed of solid matter.

15. An apparatus according to claim 12 to 14, **characterized** in that

the apparatus is arranged to determine an amount target (CU_{SP}) for the solid matter to be fed to the intermediate storage or treating process on the basis of the amount of solid matter exiting from the intermediate storage or storage tank or the amount of solid matter treated in the treatment process;

the apparatus is arranged to control the amount of solid matter to be fed in the feeding point (SP) by adjusting the speed (S) of the belt conveyor (2, 2', 3, 5) on the basis of the amount target (CU_{SP}) for the solid matter; and that

the apparatus is arranged to control the unloading speed (SU) of the solid matter unloaded to the belt conveyor (2, 2') in the unloading point (UP) on the basis of the speed (S) of the belt conveyor (2, 2') in such a way that the thickness of the material bed formed of the solid matter unloaded to the belt conveyor (2, 2') follows the set value set for the thickness of the material bed.

16. An apparatus according to any one of claims 12 to 15, **characterized** in that the set value of the thickness of the material bed of the solid matter unloaded to the belt conveyor (2, 2') is a permanently fixed constant value.

17. An apparatus according to any one of claims 12 to 16, **characterized** in that the apparatus is further arranged to define a material bed profile (PROF) expressing variation in the thickness of the material bed of the solid matter on the belt conveyor (2, 2', 3, 5) in the longitudinal direction of the belt conveyor (2, 2', 3, 5) on the basis of the speed (S) of the belt conveyor (2, 2', 3, 5) and the speed (SU) of the unloader (1, 1').

18. An apparatus according to claim 17, **characterized** in that the apparatus comprises means for determining a variable (M_C, M_{CU}) expressing the weight of the solid matter on the belt conveyor (2, 2', 3, 5); and that the apparatus is arranged to update the profile (PROF) of the material bed of the solid matter being at a given point of the belt conveyor (2, 2', 3, 5) on the basis of the variable (M_C, M_{CU}) expressing the weight of the solid matter on the belt conveyor (2, 2', 3, 5).

19. An apparatus according to any one of claims 17 or 18, **characterized** in that the apparatus is arranged to combine solid matter kind and/or grade information with the material bed profile (PROF)

expressing variation in the thickness of the material bed of the solid matter on the belt conveyor (2, 2', 3, 5).

20. An apparatus according to any one of claims 12 to 19, **characterized** in that the solid matter is formed of chips and that the intermediate storage is a chip silo (6).

21. An apparatus according to any one of claims 12 to 19, **characterized** in that the solid matter is solid fuel and that the treatment process of the solid matter is a power boiler, where the solid matter is arranged to be combusted for producing energy.

22. An apparatus according to any one of claims 12 to 19, **characterized** in that the solid matter is rock, concrete and/or asphalt and that the solid matter treatment process is a crushing, screening and/or mixing process.